20. (New) The thermosettable adhesive according to claim 17, wherein the at least one reinforcing, copolymerizable monomer comprises isobornyl acrylate, N-vinyl pyrrolidone, N-vinyl caprolactam, N-vinyl piperidine, N,N-dimethylacrylamide, acrylonitrile, or combinations thereof.

REMARKS

Claims 1-20 are pending in the present application. By this Amendment, claims 1, 5-7, and 10 are amended; and new claims 11-20 are added. Applicants respectfully request reconsideration of the present claims in view of the foregoing amendments and the following remarks.

I. Formal Matters:

Claim Rejections Under 35 U.S.C. § 112, Second Paragraph

Claims 1 and 5-7 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for allegedly failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. This rejection is respectfully traversed.

The Office Action rejects independent claim 1 due to the alleged uncertainty of the scope of the term "hydroxides" as used in original claim 1. Applicants have amended independent claim 1 as shown above to clarify that the thermosettable adhesive includes compounds selected from **hydroxides of Al, Mg and Zr**; hydroxyoxides of Al, Mg and Zr; or combinations thereof.

The Office Action rejects claim 5 due to the alleged insufficient antecedent basis for the terms "photopolymerizable precursor," "a photopolymerizable prepolymerized mixture," and "compounds selected from epoxy monomers." Applicants respectfully submit that these terms as used have proper antecedent basis. As made clear by the amendments above, Applicants' claimed thermosettable adhesive is a reaction product formed by photopolymerization of an adhesive precursor composition containing a number of specific components.

The Office Action rejects claim 6 due to the alleged uncertainty as to whether the "at least one hydroxy-substituted acrylic ester of a non-tertiary alcohol" of claim 6 is the same as or in addition to the acrylate component of claim 5(i). Applicants submit that claim 6 clearly adds an additional compound to the compound of claim 5(i). See page 21, lines 9-21 of the specification, which specifically teaches the combination of a hydroxy-substituted acrylic ester of a non-tertiary alcohol (as recited in claim 6) and an acrylate component (as recited in claim 5(i)).

The Office Action rejects claim 7 due to the alleged insufficient antecedent basis for the terms "polyester" and "compounds selected from epoxy monomer... ." Applicants respectfully submit that these terms as used have proper antecedent basis. As made clear by the amendments above, Applicants' claimed thermosettable adhesive is a reaction product formed by photopolymerization of an adhesive precursor composition containing a number of specific components.

Applicants have amended claims 1, 5 and 7 as shown above. Applicants respectfully submit that claims 1 and 5-7, as well as the remaining claims, meet the definiteness requirements of 35 U.S.C. § 112, second paragraph. Accordingly, Applicants respectfully request withdrawal of this rejection.

II. Prior Art Rejections:

Claim Rejections Under 35 U.S.C. § 103(a)

Claims 1-6 and 8-10 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,086,088 to Kitano et al. (hereinafter "Kitano") in view of U.S. Patent No. 4,778,253 to Siga et al. (hereinafter "Siga"). This rejection is respectfully traversed.

Applicants' claimed invention, embodied in claim 1, is drawn to a thermosettable adhesive comprising, *inter alia*, a thermosettable polymer component; a thermoformable polymer component; an effective amount of a heat-activatable or photoactivatable curing system or combinations thereof for curing the thermosettable polymer component; and 0.5 to 20 wt% of one or more compounds selected from hydroxides of Al, Mg and Zr; hydroxyoxides of Al, Mg and Zr; or combinations thereof.

Applicants' claimed invention, embodied in claim 10, is drawn to a thermosettable adhesive comprising, *inter alia*, a thermosettable polymer selected from epoxy resins, monomers, and oligomers; a thermoformable polymer selected from polyacrylate homopolymers and copolymers; an effective amount of a curing agent for the thermosettable polymer component; and 0.1 to 20 wt% of one or more compounds selected from hydroxides of Al and hydroxyoxides of Al.

Applicants have discovered that the incorporation of from about 0.5 to 20 wt% of one or more compounds selected from hydroxides of Al, Mg and Zr; hydroxyoxides of Al, Mg and Zr; or combinations thereof; into thermosettable adhesive compositions improves the 90° peel adhesion of the thermosettable adhesive to polar surfaces, such as metal, glass, and painted surfaces. Applicants were the first to discover the uniqueness of these inorganic filler materials and their effect on the 90° peel adhesion of the thermosettable adhesive to polar

surfaces. Further, Applicants recognized the uniqueness of these inorganic filler materials compared to conventional inorganic filler materials, such as those disclosed from page 17, line 26 to page 18, line 3 of Applicants' specification.

Kitano discloses thermosetting adhesives, which contain one or more polymerizable components and/or one or more crosslinkable components as recited in Applicants' claims 1 and 10. Kitano also teaches the addition of one or more specific fillers in the thermosetting adhesives, particularly glass microspheres, thermoplastic expandable microspheres, or hydrophobic silica.

Kitano fails to teach or suggest a thermosettable adhesive composition containing (1) hydroxides of Al, Mg, or Zr; or (2) hydroxyoxides of Al, Mg, or Zr.

The Office Action relies on the teaching of Siga to allegedly cure the above-noted deficiencies in the teaching of Kitano. Siga discloses a device for retaining an optical part, wherein the device comprises an optical element, a holding frame, and an adhesive for bonding the optical element to the holding frame. The adhesive of Siga comprises an UV-curable adhesive containing one or more inorganic fillers. Suitable inorganic fillers include quartz, glass, asbestos, talc, calcium carbonate, mica, alumina, zinc oxide, aluminum hydroxide, boron nitride, or the like. Siga fails to teach or suggest hydroxyoxides of Al, Mg, or Zr as suitable inorganic fillers.

The Office Action suggests that one of ordinary skill in the art would have (1) reviewed the teaching of Kitano, (2) combined the teaching of Kitano with the teaching of Siga; (3) picked the aluminum hydroxide filler from the many fillers disclosed by Siga; and then (4), would have been motivated to substitute the aluminum hydroxide of Siga for the glass microspheres or the hydrophobic silica in the teaching of Kitano in order to produce Applicants' claimed thermosettable adhesive. Applicants disagree.

It is not clear to Applicants why one of ordinary skill in the art, given the teaching of Kitano, would have combined the teaching of Kitano with the teaching of Siga. Kitano specifically addresses the need for better adhesive compositions for the automotive industry (See "Description of the Related Art" and from column 7, line 52 to column 8, line 2), while Siga specifically addresses the need for better adhesive compositions for bonding optical devices such as a lens to a lens holder.

Further, it is not clear to Applicants why one of ordinary skill in the art, given the teaching of Siga, would focus on the aluminum hydroxide filler of Siga when Siga discloses numerous fillers. Siga provides no guidance to one of ordinary skill in the art to pick aluminum hydroxide from the list of suitable fillers disclosed in Siga.

Moreover, it is not clear to Applicants why one of ordinary skill in the art would have been motivated to substitute the aluminum hydroxide of Siga for the glass microspheres or the hydrophobic silica in the teaching of Kitano. In fact, Kitano teaches away from such a substitution. In column 6, lines 12-33, Kitano specifically discloses a desired filler in the form of glass microspheres in order to produce a thick, foam-like pressure-sensitive adhesive composition. The only other desired filler material specifically identified by Kitano is hydrophobic silica (see column 6, line 65 to column 7, line 3). As explained in U.S. Patents Nos. 4,710,536 and 4,749,590 (Klingen et al., assigned to Minnesota Mining and Manufacturing Company, St. Paul, MN, the assignor of the present application), the addition of hydrophobic silica into polyacrylate-containing pressure sensitive adhesives improves the adhesion and other physical properties of the adhesive, including resistance to cold shock. Kitano does not suggest to one of ordinary skill in the art the need to substitute some other filler material for the glass microspheres or the hydrophobic silica in the disclosed adhesive compositions. In fact, Kitano teaches away from such a substitution given that Kitano achieves a desired result from the use of these specific filler materials.

The Office Action suggests that one of ordinary skill in the art would have been motivated to substitute one of the fillers of Siga for the specific fillers in the teaching of Kitano to obtain "a thermosettable pressure sensitive adhesive with reduced water absorption properties, as suggested by Siga." Applicants disagree. There is no suggestion in the teaching of Kitano that water absorption of the disclosed adhesive compositions is of any concern to Kitano. As discussed above, Kitano teaches the use of specific filler materials to obtain a desired property of the adhesive composition. Such a substitution as suggested by the Office Action would only occur by ignoring the teaching of Kitano and compromising the desired properties of the adhesive composition obtainable from the use of glass microspheres or the hydrophobic silica.

For at least the reasons given above, Applicants respectfully submit that one of ordinary skill in the art would not have (1) reviewed the teaching of Kitano; (2) combined the teaching of Kitano with the teaching of Siga; (3) picked the aluminum hydroxide filler from the many fillers disclosed by Siga; and (4) substituted the aluminum hydroxide of Siga for the glass microspheres or the hydrophobic silica in the teaching of Kitano in order to produce Applicants' claimed thermosettable adhesive absent the impermissible use of hindsight. The only motivation for such a modification of the teaching of Kitano has been deemed from a review of Applicants' invention, not from what is being taught or suggested by Kitano, alone or in combination with Siga. The teaching of Kitano, alone or in combination with Siga, does not in any way suggest Applicants' thermosettable adhesive.

Given that the combination of the teachings of Kitano and Siga is improper, Applicants submit that claims 1 and 10 are patentable over the combined teachings of Kitano and Siga. Since dependent claims 2-9, and 11-16 depend from independent claims 1 and 10 and recite further claim features, Applicants submit that claims 2-9, and 11-16 are also patentable over the combined teachings of Kitano and Siga. Accordingly, Applicants respectfully request withdrawal of this rejection.

Claims 1-10 are rejected under 35 U.S.C. §103(a) as being unpatentable over European Patent Application No. 0798354 A1 to Karim et al. (hereinafter "Karim") in view of Siga. This rejection is respectfully traversed.

Applicants' claimed invention embodied in claims 1 and 10, and the teaching of Siga may be relied upon above.

Karim teaches thermosettable adhesives similar to those disclosed in Kitano. Like Kitano, Karim fails to teach or suggest thermosettable adhesives containing hydroxides of Al, Mg, and Zr or hydroxyoxides of Al, Mg, and Zr.

The Office Action relies on the teaching of Siga to allegedly cure the above-noted deficiencies in the teaching of Karim. As with the rejection based on the combined teachings of Kitano and Siga discussed above, the Office Action suggests that one of ordinary skill in the art would have (1) reviewed the teaching of Karim, (2) combined the teaching of Karim with the teaching of Siga; (3) picked the aluminum hydroxide filler from the many fillers disclosed by Siga; and then (4), would have been motivated to substitute the aluminum hydroxide of Siga for the optional fillers in the teaching of Karim in order to produce Applicants' claimed thermosettable adhesive. Applicants disagree.

It is not clear to Applicants why one of ordinary skill in the art, given the teaching of Karim, would have combined the teaching of Karim with the teaching of Siga. Like Kitano, Karim specifically addresses the need for better adhesive compositions for the automotive industry (See "Background of the Invention," "Short Description of the Invention," and page 11, lines 16-27), while Siga specifically addresses the need for better adhesive compositions for bonding optical devices such as a lens to a lens holder.

Further, it is not clear to Applicants why one of ordinary skill in the art, given the teaching of Siga, would focus on the aluminum hydroxide filler of Siga when Siga discloses numerous fillers. Siga provides no guidance to one of ordinary skill in the art to pick aluminum hydroxide from the list of suitable fillers disclosed in Siga.

Moreover, it is not clear to Applicants why one of ordinary skill in the art would have been motivated to incorporate aluminum hydroxide of Siga into the adhesives of Karim given that Karim teaches away from the use of inorganic fillers. Karim teaches that

the incorporation of inorganic fillers into the disclosed adhesive compositions may result in undesirable properties in the cured adhesive. See, for example, page 2, lines 37-42, where Karim discloses:

> Adding pigments of fillers like, for example, fumed silica to the precursor which is also mentioned in US 088, typically results in a thixotropic precursor the viscosity of which was found to decrease often rapidly with time. It is furthermore difficult to remove air bubbles from the thixotropic precursor comprising a filler component, and the physical and visual profiles of the adhesive layer obtained after the final thermal cure do not meet all practical requirements to a desirable degree.

Also see page 10, lines 21-25, where Karim discloses a preference toward organic fillers over inorganic fillers:

> The use of inorganic fillers and/or pigments is often disadvantageous because these typically render the precursor thixotropic so that the removal of entrapped air bubbles during coating, for example, becomes very difficult which results in poor physical and visual properties of the final thermoset adhesive. If the addition of a viscosity modifying agent is desirable core/shell modifiers comprising a low T_g core polymer and a shell polymer which is compatible with the precursor, are preferably used instead of inorganic fillers.

Karim does not suggest to one of ordinary skill in the art the need to substitute an inorganic filler material, especially aluminum hydroxide as disclosed by Siga, for the preferred organic core/shell filler materials in the disclosed adhesive compositions. In fact, Karim teaches away from such a substitution given that Karim teaches away from the use of inorganic filler materials.

The Office Action suggests that one of ordinary skill in the art would have been motivated to substitute one of the fillers of Siga for the specific fillers in the teaching of Karim to obtain "a thermosettable pressure sensitive adhesive with reduced water absorption properties, as suggested by Siga." Applicants disagree. There is no suggestion in the teaching of Karim that water absorption of the disclosed adhesive compositions is of any concern to Karim. As discussed above, Karim discourages the incorporation of inorganic fillers into the disclosed adhesive compositions. Such a substitution as suggested by the

Office Action would only occur by ignoring the teaching of Karim and compromising the desired properties of the adhesive composition obtainable from the use of Karim's preferred organic filler materials.

For at least the reasons given above, Applicants respectfully submit that one of ordinary skill in the art would not have (1) reviewed the teaching of Karim; (2) combined the teaching of Karim with the teaching of Siga; (3) picked the aluminum hydroxide filler from the many fillers disclosed by Siga; and (4) incorporated the aluminum hydroxide of Siga into the adhesive compositions of Karim in order to produce Applicants' claimed thermosettable adhesive absent the impermissible use of hindsight. The only motivation for such a modification of the teaching of Karim has been deemed from a review of Applicants' invention, not from what is being taught or suggested by Karim, alone or in combination with Siga. The teaching of Karim, alone or in combination with Siga, does not in any way suggest Applicants' thermosettable adhesive.

Given that the combination of the teachings of Karim and Siga is improper, Applicants submit that claims 1 and 10 are patentable over the combined teachings of Karim and Siga. Since dependent claims 2-9, and 11-16 depend from independent claims 1 and 10 and recite further claim features, Applicants submit that claims 2-9, and 11-16 are also patentable over the combined teachings of Karim and Siga. Accordingly, Applicants respectfully request withdrawal of this rejection.

III. New Claims 11-20:

New claims 11-20 are directed to further embodiments of Applicants' claimed invention. New claims 11-16 depend from independent claims 1 and 10, and recite additional claim features as shown above. Support for new claims 11-16 may be found throughout the specification, particularly at page 11, lines 6-9; page 17, lines 4-7; and page 17, lines 17-18.

New independent claim 17 is directed to a thermosettable adhesive comprising a reaction product formed by photopolymerization of an adhesive precursor comprising: (i) from about 25 to 60 wt.% of a photopolymerizable, optionally partly prepolymerized mixture comprising at least one acrylic acid ester of a non-tertiary alcohol, and at least one reinforcing, copolymerizable monomer; (ii) from about 8 to 60 wt.% of one or more first compounds selected from epoxy monomers, epoxy oligomers, epoxy resins, or combinations thereof, wherein the one or more first compounds contain no photopolymerizable groups; (iii) from 0 to 15 wt.% of one or more additional thermoformable polymers selected from polyvinylacetate, poly(ethylene vinyl acetate), polyacetals, polyesters, poly(caprolactones), or combinations thereof; (iv) from about 0.1 to 10 wt.% of a heat-activatable curing system for

the epoxy component (ii); (v) from about 0.005 to 3 wt.% of a photoinitiator for the acrylate components (i); and (vi) from about 0.1 to 20 wt.% of one or more second compounds selected from hydroxides of Al; hydroxyoxides of Al; or combinations thereof; wherein all weight percentages are based on the total weight of the thermosettable adhesive. New claims 18-20 depend from new independent claim 17, and recite additional claim features as shown above. Support for new claims 17-20 may be found throughout the specification, particularly original claims 1-10; page 11, lines 6-9; page 17, lines 4-7; and page 17, lines 17-18.

Applicants respectfully submit that new claims 11-20 are patentable over the art of record for at least the reasons given above in regard to claims 1-10.

IV. Conclusion:

The art of record, Kitano, Karim, Siga, or any combination thereof, fails to teach or suggest Applicants' claimed invention as embodied in claims 1-20 above. In addition, Kitano, Karim, Siga, or any combination thereof, fails to recognize the problem of 90° peel adhesion between thermosettable adhesives and polar surfaces as recognized by Applicants, and moreover, Kitano, Karim, Siga, or any combination thereof, fails to solve such problem. Applicants were the first to discover that the incorporation of one or more specific inorganic compounds into thermosettable adhesives lead to improved 90° peel adhesion between the thermosettable adhesive and polar surfaces; the discovery of which is embodied in Applicants' claimed invention.

For at least the reasons given above, Applicants submit that claims 1-20 define patentable subject matter. Accordingly, Applicants respectfully request allowance of these claims.

No additional fees are believed due; however, the Commissioner is hereby authorized to charge any deficiency, or credit any overpayment, to Deposit Account No. 13-2725.

Should the Examiner believe that anything further is necessary to place the application in better condition for allowance, the Examiner is respectfully requested to contact Applicants' representative at the telephone number listed below.

Respectfully submitted,
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Patents

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
Feichtmeier et al.	)	
Serial No.: **09/582,512**	)	Art Unit: **1711**
Filed: **June 27, 2000**	)	Examiner: **McClendon, S.**
For: **THERMOSETTABLE ADHESIVE**	)	

MARKED UP VERSIONS OF SPECIFICATION PARAGRAPHS AND CLAIMS ACCOMPANYING APPLICANTS' JULY 26, 2001 AMENDMENT AND RESPONSE

Applicants provide the following marked up versions of the claims, which were amended in Applicants' July 26, 2001 Amendment and Response filed in response to the April 26, 2001 Office Action. In the amendments below, [brackets] are used to show where terms were removed from the specification or claims, while underlines are used to show where terms were added to the specification or claims.

In The Claims:

The following amendments were made to the claims:

1. (Twice Amended) Thermosettable adhesive comprising a thermosettable polymer component, a thermoformable polymer component, an effective amount of heat-activatable or photoactivatable curing system or combinations thereof for curing the thermosettable polymer component, and from 0.5-20 wt.% [with respect to the mass of the thermosettable adhesive] of one or more compounds selected from hydroxides [and] of Al, Mg and Zr; [,] hydroxyoxides of Al, Mg and Zr; [,] or combinations thereof, wherein all weight percentages are based on a total weight of the thermosettable adhesive.

5. (Twice Amended) Thermosettable adhesive according to claim 1, wherein the adhesive is a reaction product formed [which is obtainable] by photopolymerization of an adhesive [a] precursor comprising:

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(i) from about 25 to 60 wt.% of a photopolymerizable, optionally partly prepolymerized mixture comprising at least one acrylic acid ester of a non-tertiary alcohol, and at least one reinforcing, copolymerizable monomer[,];

(ii) from about 8 to 60 wt.% of one or more compounds selected from epoxy monomers, epoxy oligomers, epoxy resins, or combinations thereof, wherein the one or more compounds contain no photopolymerizable groups[,];

(iii) from 0 to 15 wt.% of one or more additional thermoformable polymers selected from [the group comprising] polyvinylacetate, poly(ethylene vinyl acetate), polyacetals, polyesters, poly(caprolactones), or combinations thereof[,];

(iv) from about 0.1 to 10 wt.% of a heat-activatable curing system for the epoxy component (ii)[,];

(v) from about 0.005 to 3 wt.% of a photoinitiator for the acrylate components (i)[,]; and

(vi) from about 0.1 to 20 wt.% of one or more compounds selected from hydroxides [and] of Al, Mg and Zr[,]; hydroxyoxides of Al, Mg and Zr[,]; or combinations thereof;

wherein all weight percentages [refer to the mass] are based on the total weight of the thermosettable adhesive.

6. (Amended) Thermosettable adhesive according to claim 5, wherein the acrylate component (i) [additionally] further comprises at least one hydroxy-substituted acrylic ester of a non-tertiary alcohol in addition to the at least one acrylic ester of a non-tertiary alcohol.

7. (Twice Amended) Thermosettable adhesive according to claim 1 [which is obtainable] formed by extrusion of a mixture comprising:

(i) from about 2 to 80 wt.% of one or more polyesters[,];

(ii) from about 5 to 80 wt.% of one or more compounds selected from epoxy monomers, epoxy oligomers, epoxy resins, or combinations thereof[,];

(iii) from 0 to 15 wt. % of one or more additional thermoformable polymers selected from [the group consisting of] polyacrylate, polyvinylacetate, poly(ethylene vinyl acetate), polyacetals, poly(caprolactones), or combinations thereof[,];

(iv) an effective amount of one or more heat-activatable or one or more photoactivatable curing systems, or combinations thereof, for the epoxy component (ii)[,]; and

(v) from about 0.1 to 20 wt.% of one or more compounds selected from hydroxides of Al, Mg and Zr[,]; hydroxyoxides of Al, Mg and Zr[,]; or combinations thereof,

wherein [the] an onset temperature of [the] a curing reaction of the epoxy component (ii) is higher than [the] an extrusion temperature and wherein all weight percentages [refer to the mass] are based on the total weight of the thermosettable adhesive.

10. (Amended) A thermosettable adhesive comprising:

(i) a thermosettable polymer selected from the group consisting of epoxy resins, epoxy monomers, and epoxy oligomers;

(ii) a thermoformable polymer selected from polyacrylate homopolymers and copolymers;

(iii) an effective amount of a curing agent for the thermosettable polymer; and

(iv) 0.1 to 20 weight percent of [a metal hydroxide] one or more compounds selected from the group consisting of aluminum hydroxides and aluminum hydroxyoxides, based on a total weight of the thermosettable adhesive.

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